Outline

- Do’s and Don’ts in making surgical incision
- Common mistakes encountered
- Correct surgical incision
- Surgical approach to the finger- dorsal and volar
- Surgical approach to the hand- dorsal and volar
- Surgical approach to the wrist
Correct Incisions

A correct incision provides:
- a large area to easily permit dissection
- Repair of lesions
- Heal rapidly
- Without scars limiting mobility
- Preserve sensation
- Avoid painful scars

Dupuytren’s contracture release – post op healing
Incorrect Incision

They are responsible for:
- An Insufficient access
- Necrosis
- Contractures
- Anaesthetic areas
- Painful scars
Pre – operative Planning

• In no place is sound knowledge of surface and deep anatomy more relevant than in the surgical approaches of the hand

• Design of every incision must take into account the structure and mobility of area it crosses
Pre-operative Planning

Arrangements made before surgery

- Instruments,
- Sutures,
- Implants
- Microscope, loupes
- Imaging,
- Power instruments
Pre-operative Planning

Positioning
- Supine
- Lateral
- Dorsal

Hand table

Stool

Tourniquet
- Pneumatic
- Exsanguination

Cautery
- Bipolar
Immobility of the Incision area

Incisions are made in areas of relative immobility

- Lateral midline
- Along diagonals traversing volar surface
Potentially damaging incisions

Longitudinal incisions crossing flexion creases vertically in the palmar area

Incisions close and parallel to the web
Potentially damaging incisions

Longitudinal anterolateral incisions damages the neurovascular bundles

Incisions crossing thenar crease vertically in the hollow of the palm
Potentially damaging incisions

- Incisions on the palmar pulp
- Circumferential / spiral incisions
Potentially damaging incisions

Fishmouth opening of pulp leaves a painful scar

Incisions directly on the creases leads to maceration, delayed healing.
Surface anatomy
Deeper structures
awareness about the level of joints

3rd, 4th and 5th MP joints - at distal palmar crease
2nd MP joint - at Proximal Palmar crease
Deeper structures level of tendons

Incisions to expose tendons
- Not directly over it
- Nor along its longitudinal axis
- Skin flaps adequately planned
- Tendons must glide freely later
Vascular Supply

Centre of the palm –
Poorly vascularised

Extensive undermining is to be avoided

This becomes important in Dupuytren’s contracture release
Vascular Supply – dorsum

Dorsal skin is
- thinner
- Poorer blood supply

Main venous and lymphatic drainage of hand

Avoid acute angled flaps
Vascular Supply

Dorsum

Transverse incisions going through all the subcutaneous tissue should be avoided.

If necessary only the transverse communicating veins should be ligated.
Incision on previous wound
Previous wounds and scars

Incisions should be modified if a wound already exists

Surgical extension of wounds always a difficult problem

Draw in ink on the proposed extension
Previous wounds and scars

**Common Mistakes**

Incisions should never branch off from the middle of wound

Produces ischaemic skin flaps

Converts linear scars to stellate scars which are more disabling
Wound enlarged only at its extremities in a “Bayonet like” fashion
Correct option
Correct option

Convert a linear longitudinal scar to a zig-zag scar
Where should we place our incision?
Incision

Produces stellate scars
In the line of Excursion of tendons

Ischaemic skin flaps
Incision placed well away from line of excursion

Viable skin flaps
Incisions in common use

Fingers
- Palmar
- Dorsal

Palm / dorsum

Web space

Thumb

Proximal palm / wrist
Surgical approach in finger

INDICATIONS
- OPEN REDUCTION AND STABILIZATION OF PHALANGEAL FRXS
- EXPOSURE OF FIBROUS FLEXOR SHEATHS
- EXPOSURE OF THE NEUROVASCULAR BUNDLE
Palmar approaches

Midlateral incisions
- A

Mid-axial incisions
- B
Mid-axial Incision

Incision determined by
- Connect apex of flexor crease
- Note point of change between dorsal and palmar surface
Mid-axial incisions

Dorsal to Cleland’s ligaments

No change in the length of incision line with flexion/extension

No skin tethering

Outside the region of Littler’s diamond
Mid-axial incisions

**Pitfall** – division of Dorsal branch of digital nerve
Mid-lateral incisions

Longitudinal line at mid portion of the palmar and dorsal surface

Volar to Cleland’s ligaments
Mid-lateral incisions

Dorsal branch of digital nerve preserved

Risk of scar > as line runs through Littler’s Diamond
Littler’s Diamonds

3 diamond shaped areas formed as shown.

Length of boundary lines does not change with flexion.
Littler’s Diamonds

Incisions permitted

- **Transverse** within diamond
- **Longitudinal** in between the diamond and midaxial lines
Zigzag incisions

1. Bruner’s
2. Littler’s
3. Diagonal lateral mixed
4. Mixed diagonal
5. Diagonal for thumb
VOLAR APPROACH TO FLEXOR TENDONS

ADVANTAGES

▪ BEST POSSIBLE EXPOSURE TO FLEXORS TENDONS WITH SHEATHS
▪ EXPOSURE OF NEURO VASCULAR BUNDLE
▪ SKIN INCISION MAY BE EXTENDED INTO PALM AND WRIST- ESPECIALLY IN CASE OF TRAUMA
▪ SKIN LACERATIONS INCORPORATED IN TO THE INCISION

DISADVANTAGES

▪ SURGERY ON PHALANGES IS NOT SELDOM NECESSARY IN THIS APPROACH
▪ MAY LEAD TO ADHESIONS WITH IN THE FLEXOR SHEATHS

INDICATIONS

▪ EXPLORATION AND REPAIR OF FLEXOR TENDONS AND NEUROVASULAR BUNDLE
▪ FOR DRAINAGE OF PUS FROM FLEXOR SHEATHS
▪ EXCISION OF TUMOURS
▪ EXCISION OF PALMAR FASCIA IN DUPUYTREN’S CONTRACTURES
LANDMARKS

- DISTAL PHALANGEAL CREASE – PROXIMAL TO DIP
- PROXIMAL PHALANGEAL CREASE - PROXIMAL TO PIP
- PALMAR DIGITAL CREASE – DISTAL TO MCP JOINT

INCISION

- MAKE METHYLENE BLUE OUT LINE ON PROPOSED INCISION
- THE ANGLES OF ZIGZAG SHOULD BE IN $90^\circ$ TO EACH OTHER (LESS THAN $90^\circ$ MAY POSE SKIN NECROSIS)
- THE ANGLE SHOULD NOT BE TOO FAR IN DORSAL DIRECTION

SUPERFICIAL DISSECTION

- ELEVATE THE FLAPS WITH SKIN HOOKS ALONG WITH SUBCUTANEOUS TISSUE
- DO NOT MOBILIZE FLAPS UNTIL THE FLEXOR SHEATHS REACHED
DEEP DISSECTION

- Flexor tendons lie within the flexor sheath along with double synovial layer
- Neurovascular bundle is dissected from volar subcutaneous fat with a small pair of scissors – for neurovascular bundle repair
- Important to preserve the A2 and A4 pulleys

DANGERS

- Digital vessels and nerves
- Skin flaps should not be cut at too acute angles
### Comparision between palmar incisions

<table>
<thead>
<tr>
<th>Anatomical parameters</th>
<th>Mid-lateral</th>
<th>Midaxial</th>
<th>Zigzag</th>
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</thead>
<tbody>
<tr>
<td>Location of NVB and Cleland’s ligaments</td>
<td>Palmar</td>
<td>Dorsal</td>
<td>Palmar</td>
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<tr>
<td>Dividing Cleland’s Ligaments</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Potential for contractures</td>
<td>+</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Convenience in access to palmar aspect</td>
<td>+</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Neurovascular bundle stays with</td>
<td>Dorsal</td>
<td>Palmar</td>
<td>Dorsal</td>
</tr>
<tr>
<td>Risk of damage to dorsal branch of digital nerve</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
INTERNERVIOUS PLANE
- NO INTERNERVIOUS PLANE AS THERE IS NO INTERMUSCULAR PLANE DEVELOPED

SUPERFICIAL DISSECTION
- DEVELOP A VOLAR SKIN FLAP BY INCISING THE SUBCUTANEOUS FAT
- NEUROVASCULAR BUNDLE LIE IN THE VOLAR FLAP
- NOT TO INCISE JOINTS

DEEP DISSECTION
- INCISE FIBROUS FLEXOR SHEATH LONGITUDINALL TO EXPOSE UNDERLYING TENDON

DANGERS
- PALMAR DIGITAL NERVE
  - TOO FAR VOLAR INCISION MAY ENDANGER THE PALMAR NERVE
Dorsal incisions

Note the distribution radial and ulnar nerve in between the knuckles

Radial nerve at anatomical snuff box

Dorsal branch of ulnar nerve near ulnar head
Dorsal incisions
Palm (transverse Incisions)

Incisions to these lines will not cause scarring

Pitfall

- Only limited exposure possible
- Eg. Trigger finger release
Palm (transverse Incisions)
Littler’s diamonds in Palm

Principles of incisions for Littler's diamonds are very much applicable here also.

Longitudinal incisions in these diamonds will cause scarring.
Palm
Longitudinal incisions

Oblique palmar axis
- Midpoint of 2\textsuperscript{nd}/3\textsuperscript{rd} metacarpal head to Pisiform

Incisions $\parallel$ to this will not cause scar contracture

Angulate incisions at the creases when extending
DRAINAGE OF THENAR SPACE

INCISION
- MAKE 4CMS CURVED INCISON ON ULNAR SIDE OF THENAR CREASE

SURGICAL DISSECTION
- DEEPEN DISSECTION IN LINE WITH THE SKIN INCISION
- PRESERVE THE DIGITAL NERVES TO THE INDEX FINGER
- IDENTIFY FLEXOR TENDON OF INDEX FINGER
- DEEP TO THE TENDON IS THENAR SPACE OPEN BY BLUNT DISSECTION

DANGERS
- MOTOR BRANCH TO THENAR MUSCLE MAY BE ENCOUNTERED AT THE PROXIMAL BORDER OF INCISION
Webspaces

Incisions here should never cross parallel to the crest of the webspace

$45^0$ angle with /without Z-Plasty is preferable
Volar wrist

3 rules followed

- **Topographical**
- Pal. Longus divides it into 2 portions
  - Radial / FPL / scaphoid
  - Ulnar / flexor tendons / ulnar NVB
- Median nerve in the midline
Volar Wrist

- Flexion crease is transverse
- Incisions must cross at an angle
Volar wrist

Incision must avoid damage to the sensory branches of the 3 nerves of the hand
To summarise

Thorough knowledge of the surface anatomy essential

Avoid
- Palmar vertical incisions in the digits
- Acute angled flaps
- Parallel incisions at the web

Preferable – lazy S / zig-zag( >90°)
FCR APPROACH TO DISTAL RADIUS

INDICATIONS
- ORIF OF FXS AND DISLOCATIONS OF DISTAL RADIUS AND CARPUS

POSITION
- PLACE SUPINE ON TABLE
- SUPINATE ARM AND PLACE ON ARMBOARD
- EXSANGUINATE ARM (IF USING Tourniquet)

INCISION
- MAKE INCISION ALONG PALPABLE FLEXOR CARPI RADIALIS (FCR) TENDON SHEATH
- MAKE ULNAR OR RADIAL CURVE SO YOU DON'T CROSS PERPENDICULAR TO FLEXION CREASE
SUPERFICIAL DISSECTION
- INCISE SKIN FLAPS AND SUBCUTANEOUS FAT
- SECTION FIBERS OF VOLAR FCR TENDON SHEATH IN LINE WITH TENDON
- RETRACT FCR TENDON ULNARLY AND INCISE THROUGH THE DORSAL ASPECT OF THE FCR SHEATH
- CAN RETRACT FCR RADially IF CARPAL TUNNEL ACCESS IS NECESSARY

DEEP DISSECTION AND ACCESS TO VOLAR WRIST JOINT
- UNDERNEATH THE FCR SHEATH IS THE FLEXOR POLlicis LONGUS (FPL) - THIS MUST BE RETRACTED ULNARLY
- AFTER THE FPL IS BLUNTLY RETRACTED, THE PRONATOR QUADRATUS (PQ) IS SEEN
- INCISE THE RADIAL AND DISTAL BORDERS OF THE PQ, ELEVATING THE MUSCLE OFF THE VOLAR RADIUS
PROXIMAL EXTENSION

- DISSECTION
  - EXTEND INCISION UP MIDDLE OF ARM
  - INCISE DEEP FASCIA BETWEEN PL AND FCR
  - RETRACT PL AND FCR TO EXPOSE FDS

- INDICATIONS
  - TO FURTHER EXPOSE MEDIAN NERVE OR RADIUS
  - MEDIAN NERVE IS IMMEDIATELY UNDER THE DEEP SURFACE OF FDS

DISTAL EXTENSION

- INDICATIONS
  - TO FURTHER EXPOSE THE SCAPHOID

- DISSECTION
  - EXTEND INCISION OBLIQUELY IN A RADIAL DIRECTION ACROSS THE FLEXOR CREASE
  - CONTINUE THIS IN LINE WITH THE THUMB RAY
  - ELEVATE THE THENAR MUSCULATURE OFF THE VOLAR WRIST CAPSULE
  - OPEN CAPSULE IF NECESSARY
Danger

- Radial artery
- Median nerve
- Palmar cutaneous branch of median nerve

**VOLAR WRIST CAPSULE LIGAMENTS**

- DO NOT REMOVE FROM VOLAR DISTAL RADIUS UNLESS ACCESS TO WRIST JOINT IS NEEDED
- ERRANT RELEASE WILL LEAD TO RADIOCARPAL INSTABILITY
DORSAL APPROACH TO WRIST

INDICATIONS
- WRIST FUSION
- SYNOVECTOMY AND REPAIR OF EXTENSOR TENDONS
- EXCISION OF LOWER END OF RADIUS
- PROXIMAL ROW CARPECTOMY

- ORIF OF DISTAL RADIUS FX (DISPLACED INTRA-ARTICULAR DORSAL LIP FXS)
- CARPAL FX AND DISLOCATIONS

DANGERS
- RADIAL ARTERY
- RADIAL NERVE (SUPERFICIAL RADIAL NERVE)
- POSTERIOR INTEROSSEOUS NERVE
POSITION
- PT SUPINE ON TABLE
- PRONATE FOREARM AND PLACE ON ARMBOARD
- EXSANGUINATE ARM

INCISION
- MAKE ~ 8 CM INCISION MIDLINE (HALFWAY BETWEEN RADIAL AND ULNAR STYLOID)
- CAN EXTEND PROXIMALLY OR DISTALLY AS NEEDED
FULL EXPOSURE OF WRIST JOINT

- INCISE RETINACULAM OVER 4TH COMPARTMENT (EXT COMM & EXT INDI)
- MOBILZE AND RETRACT THE TENDONS ULNAR AND RADIAL DIRECTION TO EXPOSE UNDERLYING RADIUS AND CAPSULE
- INCISE CAPSULE LONGITUDINALLY AND DISSECT THE DORSAL RADIOCARPAL LIGAMENT TO EXPOSE DISTAL END OF RADIUS AND CARPAL BONES
- TENDONS OF ECRL AND ECRB MUSCLES ATTACHED TO BASES OF 2ND & 3RD MCS AND LIE IN A TUNNEL, RETRACTED LATERALLY
1st compartment (APL/EPB)

Sensory branch of radial nerve
VOLAR APPROACH TO SCAPHOID

ADVANTAGES
- AVOID DAMAGING THE DORSAL BLOOD SUPPLY TO THE SUPERFICIAL RADIAL NERVE

DISADVANTAGE
- THREAT TO RADIAL ARTERY

INDICATIONS
- BONE GRAFTING FOR NON UNION SCAPHOID
- EXCISION OF PROXIMAL 1/3 OF SCAPHOID
- EXCISION OF RADIAL STYLOID
- ORIF OF FRACTURES OF SCAPHOID

POSITION
- SUPINATED HAND ON BOARD WHILE PT IS IN SUPINATION
LANDMARKS
- Tuberosity of Scaphoid - just distal to skin crease
- FCR over the scaphoid

INCISION
- 3 cm curvilinear incision over the radial aspect of wrist from tuberosity of scaphoid to radial to FCR

SUPERFICIAL DISSECTION
- Incise deep fascia
- Identify radial a., and retract laterally
- Identify FCR tendon and incise
- Retinaculum over FCR, retract medially

DEEP DISSECTION
- Incise capsule over scaphoid
- Exposes distal 2/3 rd of bone (non-articular)
- To gain best view of proximal 1/3 rd bone - place the wrist in marked dorsiflexion

DANGERS
- Radial artery
THANK YOU